

Efficiency Strategies for Facilitating Computerized Clinical Documentation in Ambulatory Care

Jason J Saleem^{a,c}, Stephanie Adams^a, Richard M. Frankel^{a,c}, Bradley N. Doebbeling^{a,c}, Emily S. Patterson^d

^a VA Health Services Research & Development (HSR&D) Center on Implementing Evidence-Based Practice, Indianapolis, IN, USA

^b Regenstrief Institute, Inc., Indianapolis, IN, USA

^c Indiana University (IU) Center for Health Services & Outcomes Research, Indianapolis, IN, USA

^d School of Health and Rehabilitation Sciences, College of Medicine, The Ohio State University, Columbus, OH, USA

Abstract

Most providers have experienced increased documentation demands with the use of electronic health records (EHRs). We sought to identify efficiency strategies that providers use to complete clinical documentation tasks in ambulatory care. Two observers performed ethnographic observations and interviews with 22 ambulatory care providers in a U.S. Veterans Affairs Medical Center. Observation notes and interview transcripts were coded for recurrent strategies relating to completion of the EHR progress notes. Findings included: the use of paper artifacts for handwritten notations; electronic templates for automation of certain parts of the note; use of shorthand and phrases rather than narrative writing; copying and pasting from previous EHR notes; directly entering information into the EHR note during the patient encounter; reliance on memory; and pre-populating an EHR note prior to seeing the patient. We discuss the findings in the context of distributed cognition to understand how clinical information is propagated and represented toward completion of a progress note. The study findings have important implications for improving and streamlining clinical documentation related to human factors workload management strategies.

Keywords:

Clinical documentation; Human factors; Workload; Workflow; Electronic health records.

Introduction

Clinical documentation is a core activity for physicians, nurses, and other healthcare professionals and accounts for a substantial portion of a clinician's workday [1-4]. One study demonstrated that nearly as much time was spent on documentation as was spent on direct patient care [5]. Computerized documentation is central to efficiently generating billing codes in ambulatory care settings [6], yet documentation demands increase with the use of the electronic health record (EHR), especially during after-clinic hours [7]. An EHR can increase clinical time pressure by adding typing, clicking, and searching through menus in patients' computerized records [8]. Increasing recognition of this problem underscores the need to re-conceptualize workflow relating to documentation as part of the next generation of EHRs [9, 10]. Although much research has been done regarding the specific content and quality of provider notes [11-14], little exists on how providers' documentation activities fit into their workflow and support their cognitive needs [15]. The aim of this study was to identify strategies providers have developed to keep up

with clinical documentation demands for computerized patient progress notes embedded within an EHR. Understanding such strategies may help inform redesigned tools and workflow for the EHR to streamline provider documentation workload.

We used the distributed cognition framework [16, 17] to conceptualize our study. Distributed cognition expands the classic notion of a single individual's internal cognition to include a unified cognitive network that spans individuals and the "artifacts" they use to do their work. The framework emerged from studies of maritime [16] and aviation [18] systems, and has more recently been applied to healthcare [19-21]. The unit of analysis is a distributed cognitive system, composed of a group of people interacting with external cognitive artifacts (e.g., providers in an ambulatory care clinic, using paper and computer tools). This entire unit of analysis, including the external artifacts, is treated as a form of cognitive architecture. A distributed cognitive system can be described in terms of internal and external representations. Internal representations are the knowledge and structures in individuals' minds; external representations are the knowledge and structures in the external environment [22]. Distributed cognition is concerned with representations inside and outside the individual's mind - and the transformation these representations undergo [23]. Using this perspective, informatics researchers can understand what information is required to carry out certain tasks and where the information should be located - as a computer interface object, or as something that is mentally represented by the provider [24]. We apply this framework to illustrate various strategies that providers use for documentation activities in an ambulatory care setting.

Methods

This study received approval from the Indiana University (IU) Institutional Review Board (IRB; study # 0905-53). Two of the authors (JS, SA) separately conducted ethnographic observations and one author (JS) conducted semi-structured, key-informant interviews. The research was performed at a single Veterans Affairs Medical Center (VAMC), which has full laboratory, pharmacy, and radiology services. Ethnographic field observation is an approach that allows study of a complex system, such as in situ use of a clinical information system, from its sociotechnical influences in the larger organization down through problems at the computer interface level [16, 25]. Rapid ethnographic observation is an ideal method to use in a busy healthcare setting, as it is minimally intrusive to busy providers and helps capture the context surrounding

the system being studied [26]. We also engaged in opportunistic interviews with the 18 participants who were directly observed during periods of time when they were less busy. This allowed us to follow-up on issues that arose during the observation, assess their thinking processes while using the software and/or related paper tools, and obtain their direct feedback on clinical documentation and computerized progress notes.

Participant Characteristics

Of the 22 participants (13 female, 9 male), 18 participated in the ethnographic observation component of the study and 4 participated in key informant interviews. All participants practiced on the ambulatory care service. The 18 participants who participated in the ethnographic observation were comprised of 10 physicians, 3 nurse practitioners, 2 clinical pharmacists, 1 physician assistant, 1 clinical psychologist, and 1 registered dietitian. Although this was a convenience sample, two-thirds of the providers observed were purposefully recruited from primary care and a third from six specialty care ambulatory clinics: cardiology, dialysis, nutrition, orthopedics, renal, and the polytrauma unit. Selection of the 4 key informants was based on their unique positions or knowledge about clinical documentation. One was a specialist in informatics (Clinical Application Coordinator - CAC) with knowledge of the computerized templates in the VA's EHR, the Computerized Patient Record System (CPRS; a comprehensive description of CPRS is available in the literature [27]). CACs support the data entry and data extraction tools used in CPRS, and also instruct clinicians in the use of CPRS. A licensed practical nurse and a registered nurse were selected for key informant interviews based on their direct involvement in generating the printed patient encounter forms used by the primary care providers for documentation. Finally, a high-level clinician administrator, also an active primary care physician, was selected as a key informant based on his leadership in ambulatory care. Participants had an average of 11 years of VA experience and an average of 9 years of CPRS experience. Because CPRS was implemented about 13 years prior to data collection for this study (1998), 13 years represents the maximum duration of experience with CPRS.

Data Collection

Data were collected over a period of several months and at different periods of the day. Observations were recorded via handwritten notes on a structured observation form during participant interaction with the EHR and related paper artifacts, before, during, and after patient encounters. Handwritten notes were typed within a few days after each participant observation. The four key-informant interviews were digitally audio-recorded and transcribed. Observations were scheduled for one hour and the interviews for half an hour. Average participation time was 66 minutes for the 18 observations (including opportunistic interviewing) and 29 minutes for the four key-informant interviews. A total of 27 patient encounters were observed across the 18 providers who participated in the ethnographic observation.

Analysis

Data analysis followed a process of abstraction, in which details that are specific to the context of a setting are replaced by the underlying strategies that are relevant across settings [28, 29]. Two of the authors (JS and SA) independently coded the observation notes and interview transcripts for strategies relating to completion of the EHR progress notes. We integrated

findings across the participants into meaningful patterns and abstracted the data into emerging themes that described recurrent documentation strategies. The two authors resolved all differences in each of the 22 independently coded observation notes and interview transcripts by consensus in a series of ten 1-hour meetings. A descriptive word or phrase was assigned to each recurrent strategy (Table 1).

Results

Analysis revealed multiple recurrent strategies (i.e., used by more than one provider) to facilitate the completion of computerized progress notes in the EHR (Table 1). The most common strategy involved the use of paper artifacts at various points in the ambulatory care workflow; before, during, and after each patient encounter. A "patient encounter form" was pre-printed by the clinic staff for every patient on the provider's schedule. Aside from a few patient identifiers, the cover sheet of the patient encounter form is mostly blank, by design, to allow handwritten notes. The second page, and any subsequent pages, list the patient's current medications as of the time the form was printed from the EHR. Providers often used this paper encounter form, or other paper artifacts (e.g., a printed copy of the patient's last progress note or a blank piece of paper) to take handwritten notes, as described in Table 1.

Several providers used electronic templates within the EHR to facilitate completion of progress notes. These templates included personally developed templates, templates "handed down" to them from another provider, and standardized templates developed at the clinic-level. Templates were useful for auto-importing the latest vitals, lab results, and other patient information from the EHR directly into the new progress note, as well as with general organization of the note content. Use of shorthand, abbreviations, and brief notations, both on paper and in the EHR note itself, was also a common strategy and often helped providers remember key elements from a patient encounter when composing a more comprehensive note later in the day. Some providers directly entered these short notations into the EHR during the patient encounter, while others relied solely on their memory for completing an EHR note later in the day. This use of memory was also regarded as an efficiency strategy, independent of the reliability of memory and the ultimate quality of the completed progress note.

Copying and pasting material from a previous progress note in the EHR to start a new note was viewed as an efficiency strategy by many providers. Although the practice of copying and pasting was not prohibited at the study site, there is an administrative policy about not copying subjective parts of a previous note. This policy is not always followed. Finally, some providers found it efficient to start a patient's progress note in the EHR before seeing the patient. Pre-populating the note with certain information prior to the patient encounter facilitated later completion of the full progress note.

Discussion

We used the distributed cognition framework to illustrate various strategies that providers use for clinical documentation activities in ambulatory care. Figure 1 depicts how clinical information is propagated and represented before, during, and after the patient encounter. The provider, patient, EHR, and related paper tools are considered representational systems. Clinical information is transformed and displayed through

these representational systems during the ambulatory care workflow. This network, or unit of analysis, is considered a “distributed cognitive system.”

Table 1 - Identified strategies for facilitating computerized documentation of progress notes; only coded strategies that occurred with more than one participant are listed

Strategy	Description	Subjects (%)
Handwritten notes; paper artifacts		14/22 (64%)
<i>Before the patient encounter</i>	Taking handwritten notes from the EHR or other sources before seeing a patient (preparation)	8/22 (36%)
<i>During the patient encounter</i>	Using paper to take handwritten notes and/or cross off items or talking points during a patient encounter	13/22 (59%)
<i>After the patient encounter</i>	Using these handwritten notes in the construction of the computerized progress note after the encounter	5/22 (23%)
Electronic templates	Use of electronic templates in the EHR to facilitate construction and completion of the note (e.g., for auto-import of patient vitals, labs, med list; use of “stock text”; or organization of the note)	10/22 (45%)
Shorthand	Use of shorthand, abbreviations, fragments, and short phrases, (handwritten or typed) for new EHR note	7/22 (32%)
Copy & paste	A facilitator from the providers’ perspective; copying & pasting text and data from previous EHR note to new note, updating text, and then deleting unwanted text saves time in constructing new note	6/22 (27%)
Direct entry	Direct entry of info into a new EHR note during the patient visit rather than using handwritten notes or memory	5/22 (23%)
Memory	Reliance on memory to construct EHR note after the patient visit (independent of the reliability of one’s memory and the ultimate quality of the note)	5/22 (23%)
Starting the EHR note before seeing the patient	Starting the EHR note before seeing the patient and pre-populating it with some information to facilitate completing the note later	5/22 (23%)

A common scenario shown in Figure 1 involved the provider reviewing the patient’s electronic record prior to seeing the patient (a), and transcribing key information from the electronic record onto a paper printout, such as a patient encounter form or last progress note (b). The provider then referred to the printout during the patient encounter and used it to take handwritten notes (c) while conducting the patient interview (d), rather than relying on the EHR. Occasionally, the provid-

er may use the EHR during the patient encounter to reference a lab result, enter a medication order, demonstrate a finding to the patient, etc.; represented by the dotted arrow (e). After the patient encounter, the provider would use his/her handwritten notes from the same paper printout (f) to help compose the electronic progress note in the EHR (g).

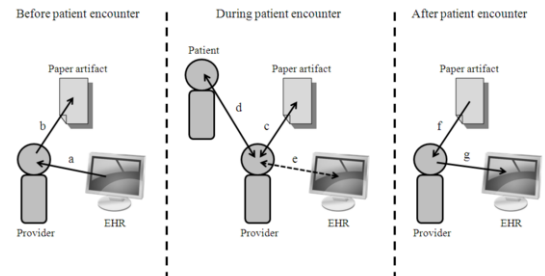


Figure 1 - Clinical documentation from a distributed cognition perspective; how clinical information is propagated, represented in the memory of the provider and patient, as well as the paper and technological artifacts

While Figure 1 illustrates the most common information workflow pattern we observed relating to clinical documentation, other strategies were observed to facilitate completion of the EHR progress note (outlined in Table 1). Some providers found it effective to start the EHR note before seeing the patient and pre-populating the EHR note with some information to facilitate completing documentation after the encounter or later in the day. Others did not take handwritten notes during the patient encounter and relied on their memory to compose the EHR progress note. Some providers directly entered information into the EHR during the patient encounter as shorthand notes that they could use to help construct the full note after the encounter or later in the day. These computer notes served as “memory jogs,” just as handwritten notations did for other providers. No providers completed the EHR note before the patient left, which did not seem to be a practical option. As one of the key informants noted:

“...actually starting the note and doing the note in the room... To be honest I don’t think that is very feasible. You’re multi-tasking. You know, writing a progress note requires a certain level of concentration and thought. You’re writing a story basically. It takes some level of concentration to do that well. And to try and do that at the same time that you’re interviewing... it’s probably overwhelming for most people. So I don’t see entry of progress notes during the visit as a realistic expectation, even though it sounds very efficient.”

Given the impracticality, for many, of composing a completed note during the patient encounter, the use of paper artifacts was the most common strategy identified to help facilitate completion of the EHR progress note. Some clinicians used handwritten notations as a short list of items, data, and patient responses from which to construct a narrative electronic note after the patient encounter. Any handwritten notes that are not inputted into the VA EHR are not considered to be part of the official patient record. Although the use of paper in conjunction with the EHR can be beneficial in some cases [30], reliance on paper, as well as memory, introduces greater potential for error and gaps in EHR documentation. Making it easier for providers to directly enter notes into the EHR, in a way that fits their preferred workflow and minimizes negative impact on their interaction and communication with the patient, is an ongoing challenge. Use of automation strategies,

such as copying and pasting from previous EHR notes, as well as templates to import recent labs and other data, helps providers become more efficient in terms of writing and composing a new EHR note. However, these strategies are used at the cost of dross in the note that is both time consuming and of little value for others to read. As one key informant noted, "You now have progress notes where there's so much noise that you can't figure out what happened at the [patient] visit." These findings demonstrate a clear need for better designing and incorporating such automation strategies in ways to reduce the amount of extraneous information in new EHR notes.

Barriers to Documentation

Higher priorities, workload, and time pressure were all reasons why providers in our study experienced challenges in keeping up with EHR documentation. Several providers explicitly noted that they view documentation of an EHR note as a relatively low priority and easily deferred in favor of attending to other competing demands. One participant noted: "My priority is to take care of the patient – at the expense of documentation." This is consistent with earlier work, where documentation for nurses was specifically found to be a lesser priority than addressing imminent clinical concerns, high uncertainty activities, core clinical care-giving, as well as pain and relationship management [31]. Another barrier to documentation was the design of some of the electronic templates in the EHR. These templates, while an important efficiency strategy, also became a barrier to documentation when the design was poor. For example, one key informant noted that some templates had become too cumbersome to use because "leadership" started adding performance measure documentation into the template design. When the standard clinic templates become too long and unwieldy, some providers stop using them.

Workload Management Strategies

These findings have important implications for improving and streamlining clinical documentation related to workload management strategies described in the human factors literature [31, 32]. Common workload management strategies include rescheduling tasks, deferring or shedding tasks, reducing performance criteria, and recruiting additional resources to complete tasks. The strategy of starting an EHR progress note before seeing the patient (Table 1), to the extent a provider can, is an example of documenting ahead of schedule ("re-scheduling") in periods of lower workload. While providers typically cannot shed documentation tasks, they can and should be deferred during periods of high workload involving direct patient care tasks. Reducing performance criteria does not mean performing tasks poorly; providers should strive to compose a note free of extraneous information that is already documented in other parts of the EHR to reduce overall time spent on documentation tasks. Recruiting additional resources, in the context of clinical documentation, may involve incorporation of technologies such as voice recognition dictation software to reduce the reliance on typing. Informatics support for technologies to facilitate clinical documentation, as well as to improve the design of templates and related EHR tools, is essential to help providers keep pace with increasing documentation demands.

Limitations

Although our sample was diverse, it was limited to a single VA medical center, which may limit the generalizability of our results. Since all of the participants used the same EHR, some of the clinical documentation issues reported may be

tied to the unique characteristics of the VA's EHR. To mitigate this study limitation, we explicitly asked our participants about their experiences before joining the VA medical center and compared this outside experience with our results. Participants came from a variety of non-VA academic, military, and community hospital and smaller clinic settings. At these other healthcare settings, participants reported using paper-based records, computer-based records, and a blend of paper and computer systems. Several participants described their previous paper documentation as faster. For example, one participant noted that with computerized systems, there is greater opportunity for documenting, which corresponds to greater time for doing that documentation. However, participants were generally supportive of EHRs, noting increased legibility, convenience, accessibility, and organization of data. Consistent with our study findings, strategies to streamline provider EHR documentation workload may further improve providers' support for computerized clinical information systems and also increase efficiency.

Conclusion

We investigated strategies providers have developed to keep up with clinical documentation demands using computerized patient progress notes embedded within an EHR. Distributed cognition was used to conceptualize our study and characterize the ambulatory care setting as a form of cognitive architecture through which clinical information is propagated and represented in the context of documentation strategies. Higher priorities, workload, and time pressure were all reasons why providers in our study experienced challenges in keeping up with EHR documentation. Many current EHR systems are designed to support uninterrupted note composition. Next-generation EHRs can better facilitate clinical documentation by supporting information synthesis and sense-making [9]. Workload management strategies should be compared and assessed for accuracy, utility, and efficiency. Best practices in this domain could then be shared with providers in a systems-level intervention designed to help facilitate clinical documentation.

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Address for correspondence

Jason J. Saleem, PhD, VA HSR&D Center of Excellence, Richard L. Roudebush VA Medical Center (11-H), 1481 West Tenth St, Indianapolis, IN 46202, Email: Jason.Saleem@va.gov